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REVIEWS

Structural Geology. By C. K. LEITH. New York: Henry Holt & Co., 1913. Pp. 169; figs. 68. \$1.50.

The central feature of this admirable work is the interpretation of rock structures as expressions of dynamic processes, rather than descriptions simply. Students of geology are generally more or less familiar with the different kinds of rock structure, simply as such, but they are not so generally accustomed to interpret these structures as related parts of a record or of a process. In this work the author has adopted a philosophical mode of treatment by approaching rock structures from the point of view of the forces and processes which have produced them. The structural phenomena are aligned chiefly as the products of fracture or of flow.

As the book is relatively short, the author plunges at once into a critical discussion of rock fracture and rock flowage and of the controlling conditions which express themselves in one or the other of these two methods of deformation. Then in the light of the principles of rock fracture which have been developed, he takes up in detail the treatment of the leading rock structures resulting from this type of deformation. Of these, faults naturally receive the greatest attention, but a fair apportionment is given to joints, fracture cleavage, breccias, and autoclastics. Earthquakes, both as causes and effects of rock fracture, complete the first half of the book.

In the second half, under the heading of rock flowage, are treated in order flow cleavage, gneissic structure, and porphyritic textures developed by rock flowage. These lead to a digression on the identification of schists and gneisses, in which the stand is taken that with our present knowledge, field observations are likely to yield more satisfactory conclusions as to the igneous or sedimentary origin of given gneisses and schists than either mineral or chemical composition. Folds are treated as structures common to both the zone of fracture and the zone of flow, but folds developed in these two zones may be discriminated by the contrasts which they exhibit in a number of particulars.

Mountains and the other major units of structure each receive a brief but pointed consideration. Isostasy as an agency to explain these relief features is analyzed and then criticized on a number of

grounds. Dr. Leith states squarely that isostasy and rigidity in any high degree are mutually exclusive and as between the two he favors rigidity. The rigidity of the earth is a matter whose importance has been very generally passed over lightly, or carelessly swept aside by students of mountain building. But the brilliant determination of earth rigidity now in progress by Michelson, Gale, and Moulton firmly establishes the view favored by the author. The results seem indeed already to foreshadow that rigidity is the rock upon which not a few favorite theories are destined to be wrecked.

The average reader will perhaps be struck with the absence of numbered chapters. The framework of the book is really a skeleton outline—the familiar blackboard device of the systematic lecturer—with a few principal headings, under which are marshaled a graded series of sub-headings. The relative importance and correlation of these are rendered easy by different styles of type. For systematic study as well as classroom presentation this method has its advantages.

The treatment is strong and judicial; the discussion closely woven and effective, and while conciseness and brevity were doubtless sought, they result in very concentrated nourishment. The reviewer is of the opinion that the average working geologist will wish that the book were about twice as long. The treatise is a distinctly valuable contribution. It has no equal in its field.

R. T. C.

The Devonian and Mississippian Formations of Northeastern Ohio.

By CHARLES S. PROSSER. Geological Survey of Ohio, 4th Ser., Bulletin No. 15. Pp. ix+574, 33 plates. Columbus (1912), 1913.

The author devotes five chapters, or a major part of the bulletin, to a detailed description and discussion of the more important rock sections exposed in northeastern Ohio, together with observations on the fossils usually found associated therewith, and to a review of the literature bearing on the geology of that section of the state. This is followed by a chapter on correlation, and the bulletin concludes with the description and illustration of the major part of the Chagrin fauna, in which are included four new species and two new varieties.

The sections alone are a valuable addition to our knowledge of the geology of that region, as they bring out clearly the varying character of the rocks which have usually been classed together as a single forma-